CLAIMS

1. A life determining method of a nickel-hydride battery, comprising the steps of:

(a) preparing beforehand data representing a relationship of life of the battery to load power applied to the battery in discharge and environmental temperature of a place where the battery is installed;

(b) measuring the load power and the environmental temperature of the battery in discharge;

(c) selecting a life value corresponding to the measured values of the load power and the environmental temperature from the data to set the life value as an expected life value;

(d) calculating a first life reduction amount from a natural logarithmic function with the number-of-discharges of the battery as a variable; and

(e) setting a value obtained by subtracting the first life reduction amount from the expected life value to a remaining life value.

2. A life determining method of a nickel-hydride battery, comprising the steps of:

(a) preparing beforehand data representing a relationship of life of the battery to load power applied to the battery in discharge and environmental temperature of a place where the battery is installed;

(b) measuring the load power and the environmental temperature of the battery in discharge;

(c) selecting a life value corresponding to the measured values of the load power and the environmental temperature from the data to set the life value as an expected life value;

(d) calculating a first life reduction amount from a natural logarithmic function with the number-of-discharges of the battery as a variable;

(e) calculating an average value of battery temperatures measured at a fixed time interval during charge and discharge or during pause of the charge and discharge, to calculate a second life reduction amount from the product of the number-of-discharges and a value of an exponential function with the difference between the average value of battery temperature and the measured value of environmental temperature as a variable; and

(f) setting a value obtained by subtracting the first life reduction amount and the second life reduction amount from the expected life value to a remaining life value.

3. A life determining method of a nickel-hydride battery, comprising the steps of:

(a) preparing beforehand data representing a relationship of life of the battery to load power applied to the battery in discharge and environmental temperature of a place where the battery is installed;

(b) measuring the load power and the environmental temperature of the battery in discharge;

(c) selecting a life value corresponding to the measured values of the load power and the environmental temperature from the data to set the life value as an initial expected life value;

(d) calculating an average value of battery temperatures measured at a fixed time interval during charge and discharge or during pause of the charge and discharge, to calculate a non-periodical expected life value from the product of the initial expected life value and a value of an exponential function with the difference between the measured value of environmental temperature and the average value of battery temperature as a variable;

(e) calculating a first life reduction amount from a natural logarithmic function with the number-of-discharges of the battery as a variable;

(f) calculating a second life reduction amount from the product of the number-of-discharges and a value of an exponential function with the difference between the average value of battery temperature and the measured value of environmental temperature as a variable; and

(g) setting a value obtained by subtracting the first life reduction amount and the second life reduction amount from the non-periodical expected life value to a remaining life value.

4. A life determining apparatus of a nickel-hydride battery, comprising:

storing means which stores data indicating a relationship of life of the battery to load power applied to the battery in discharge and environmental temperature in a place where the battery is installed;

load power measuring means which measures the load power applied to the battery;

environmental temperature measuring means which measures the environmental temperature;

expected life value selecting means which selects a life value corresponding to the load power measured by the load power measuring means and the environmental temperature measured by the environmental temperature measuring means, from the data stored in the storing means as an expected life value;

number-of-discharges counting means which counts the number-of-discharges of the battery;

first life reduction amount calculating means which calculates a first life reduction amount from a natural logarithmic function with the number-of-discharges counted by the number-of-discharges counting means as a variable; and

remaining life value calculating means which calculates a remaining life value from the expected life value selected by the expected life value selecting means and the first life reduction amount calculated by the first life

reduction amount calculating means.

5. The life determining apparatus of a nickel-hydride battery according to claim 4, wherein each of the means is integrally provided for the battery.

6. The life determining apparatus of a nickel-hydride battery according to claim 4, further comprising means for displaying the remaining life value.

7. The life determining apparatus of a nickel-hydride battery according to claim 4, further comprising means for communicating the remaining life value.

8. The life determining apparatus of a nickel-hydride battery according to claim 4, further comprising means for controlling charge of the battery on the basis of the remaining life value.

9. A life determining apparatus of a nickel-hydride battery, comprising:

storing means which stores data indicating a relationship of life of the battery to load power applied to the battery in discharge and environmental temperature in a place where the battery is installed;

load power measuring means which measures the load power applied to the battery;

environmental temperature measuring means which measures the environmental temperature;

expected life value selecting means which selects a life value corresponding to the load power measured by the

load power measuring means and the environmental temperature measured by the environmental temperature measuring means, from the data stored in the storing means as an expected life value;

number-of-discharges counting means which counts the number-of-discharges of the battery;

first life reduction amount calculating means which calculates a first life reduction amount from a natural logarithmic function with the number-of-discharges counted by the number-of-discharges counting means as a variable;

battery temperature measuring means which measures battery temperatures during charge and discharge, or during pause of the charge and discharge at a fixed time interval;

average value calculating means which calculates an average value of battery temperature from battery temperatures measured by the battery temperature measuring means and the number of measurements;

second life reduction amount calculating means which calculates a second life reduction amount from the product of a value of an exponential function with the difference between the average value of battery temperature calculated by the average value calculating means and the environmental temperature measured by the environmental temperature measuring means as a variable, and the number-of-discharges measured by the number-of-discharges counting means; and

remaining life value calculating means which

calculates a remaining life value by subtracting the first life reduction amount calculated by the first life reduction amount calculating means and a second life reduction amount calculated by the second life reduction amount calculating means from the expected life value selected by the expected life value selecting means.

10. The life determining apparatus of a nickel-hydride battery according to claim 9, wherein each of the means is integrally provided for the battery.

11. The life determining apparatus of a nickel-hydride battery according to claim 9, further comprising means for displaying the remaining life value.

12. The life determining apparatus of a nickel-hydride battery according to claim 9, further comprising means for communicating the remaining life value.

13. The life determining apparatus of a nickel-hydride battery according to claim 9, further comprising means for controlling charge of the battery on the basis of the remaining life value.

14. A life determining apparatus of a nickel-hydride battery, comprising:

storing means which stores data indicating a relationship of life of the battery to load power applied to the battery in discharge and environmental temperature in a place where the battery is installed;

load power measuring means which measures the load

power applied to the battery;

environmental temperature measuring means which measures the environmental temperature;

expected life value selecting means which selects a life value corresponding to the load power measured by the load power measuring means and the environmental temperature measured by the environmental temperature measuring means from the data stored in the storing means as an initial expected life value;

number-of-discharges counting means which counts the number-of-discharges of the battery;

first life reduction amount calculating means which calculates a first life reduction amount from a natural logarithmic function with the number-of-discharges counted by the number-of-discharges counting means as a variable;

battery temperature measuring means which measures battery temperatures during charge and discharge, or during pause of the charge and discharge at a fixed time interval;

average value calculating means which calculates an average value of battery temperature from battery temperatures measured by the battery temperature measuring means and the number of measurements;

non-periodical expected life value calculating means which calculates a non-periodical expected life value from the product of a value of an exponential function with the difference between the environmental temperature measured by

the environmental temperature measuring means and the average

value of battery temperature calculated by the average value

calculating means as a variable, and the initial expected life

value selected by the expected life value selecting means;

second life reduction amount calculating means which

calculates a second life reduction amount from the product of

a value of an exponential function with the difference between

the average value of battery temperature calculated by the

average value calculating means and the environmental

temperature measured by the environmental temperature

measuring means as a variable, and the number-of-discharges

counted by the number-of-discharges counting means; and

remaining life value calculating means which

calculates a remaining life value by subtracting the first

life reduction amount calculated by the first life reduction

amount calculating means and the second life reduction amount

calculated by the second life reduction amount calculating

means from the non-periodical expected life value calculated

by the non-periodical expected life value calculating means.

15. The life determining apparatus of a nickel-

hydride battery according to claim 14, wherein each of the

means is integrally provided for the battery.

16. The life determining apparatus of a nickel-

hydride battery according to claim 14, further comprising

means for displaying the remaining life value.

17. The life determining apparatus of a nickel-

hydride battery according to claim 14, further comprising means for communicating the remaining life value.

18. The life determining apparatus of a nickel-hydride battery according to claim 14, further comprising means for controlling charge of the battery on the basis of the remaining life value.